

500mA PWM Synchronous Step-Up DC-DC Converter

Features

- High efficiency 92% (Typ.)
- Constant frequency operation 1.2MHz
- Low startup voltage 1V Max
(with 1mA input)
- Input voltage range 0.9 ~ 5V
- Output voltage range 2.5 ~ 5V
- Line regulation 1%/V
- Load regulation 0.02%/mA
- Maximum output current Li-ion battery 500mA@5.0V (Typ.)
Single AA cell 100mA@3.3V (Typ.)
- Low shutdown quiescent current 1 μ A (Typ.)
- Integrated main switch and synchronous rectifier
- No Schottky diode required in the application
- Anti-ringing circuit to reduce EMI

Applications

- Cordless Phone
- Palmtop/Laptop Computer
- Personal Digital Assistant
- Digital Camera
- Portable Multimedia Player
- Battery powered equipment
- Wireless keyboard and mouse

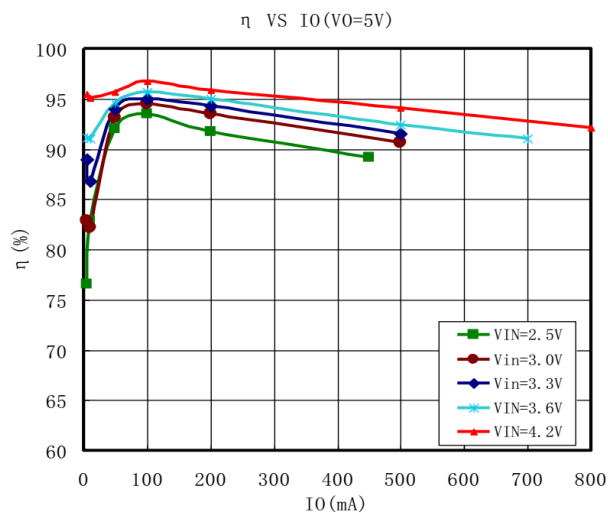
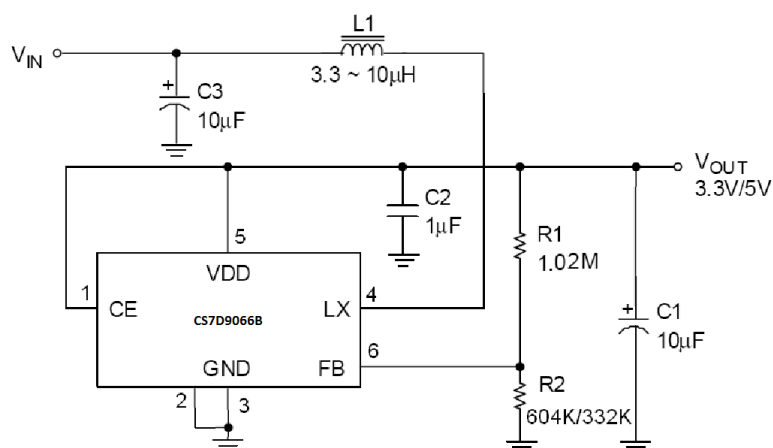
Available Package

- SOT-23-6
- RoHS compliance

General Description

The CS7D9066B is a high efficiency step-up DC-DC converter using adaptive current mode PWM Synchronous step at 1.2MHz constant frequency, which allows the use of small surface mount inductors and capacitors. The device use synchronous-rectified pulse-width modulation boost technology to generate 2.5 to 5.0V outputs from a wide range of inputs, such as 1 to 3 alkaline/NiCd/NiMH cells or a single lithium-ion (Li+) cell. Continuous switching mode is available for applications requiring constant-frequency operation at all load currents. The IC has build in NMOS switch and PMOS synchronous rectifier for high efficiency DC-DC conversion, which also help to eliminate the external Schottky diode required in most DC-DC converter.

Typical Application



Typical Efficiency Curve

Selection Guide

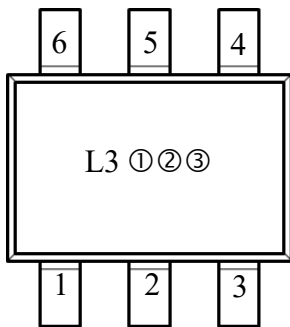
The package and taping type for the ICs can be selected at the user's request. The selection can be made with designating the part number as shown below

Part number CS7D9066B—T S G → high efficiency step-up DC-DC converter using adaptive current mode PWM Synchronous step at 1.2MHz constant frequency on a lead free SOT-23-6 package and put inside an embossed tape in standard feed form

1 2 3

Designator	Description	Symbol	Values
1	Package	T	SOT-23-6 package
2	Reel type	S	Embossed Tape : Standard feed
3	Lead free package	G	Missing label ⇒ non-lead free package

Pin Assignment and Descriptions

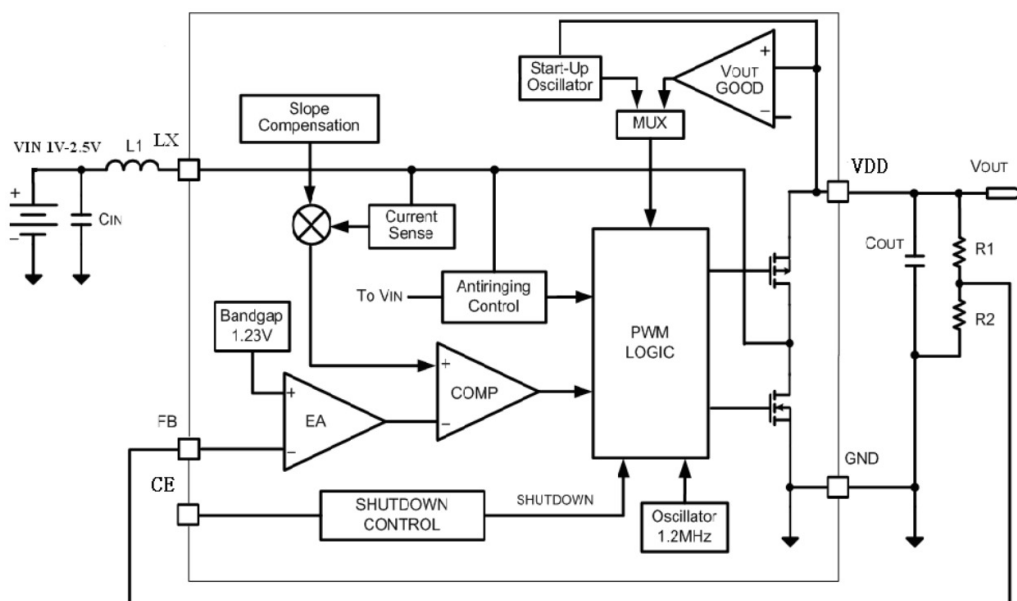


①②③

For Canaan Internal Reference Only

Pin Name	SOT-23-6	Description
CE	1	Chip enable pin—tie this pin to VDD to enable the device.
GND	2, 3	Ground pin—should be connected to ground plane for better performance.
LX	4	LX pin—for external inductor connection.
VDD	5	Power supply pin—bypass this pin with a capacitor as close to the device as possible.
FB	6	Feedback pin—PWM comparator inverting input, and is connected to off-chip resistor divider which sets output voltage, where $V_{OUT} = 1.23V * (1 + R1/R2)$. Keep the loop between V_{OUT} and FB as short as possible to minimize the ripple and noise, which is beneficial to the stability and output ripple.

Functional Block Diagram



Canaan Semiconductor

Rev A. April 2018

■ Absolute Maximum Ratings ($T_{opr} = 25^{\circ}\text{C}$)

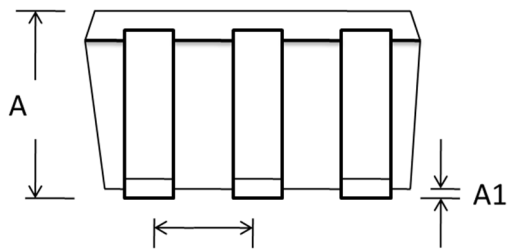
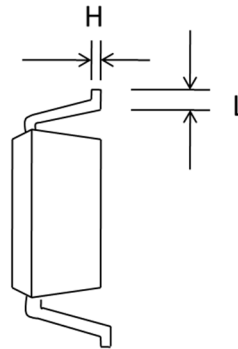
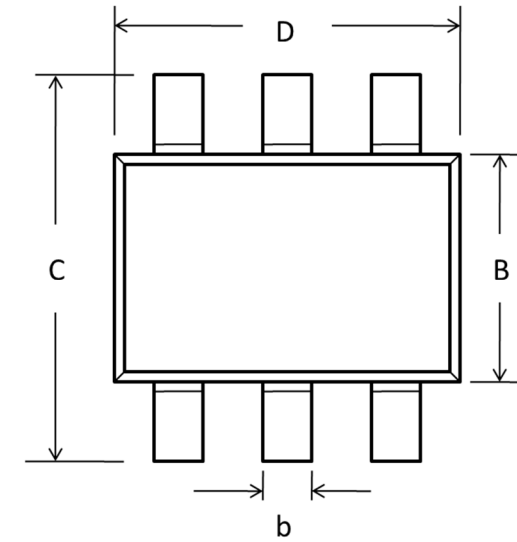
Parameter	Symbol	Value	Units
Supply voltage	V_{DD}	6	V
LX pin voltage	V_{LX}	6	V
FB pin voltage	V_{FB}	V_{DD}	A
CE pin voltage	V_{CE}	6	V
Thermal Resistance	$R_{\theta JA}$	220	$^{\circ}\text{C/W}$
Operating junction temperature	T_j	110	$^{\circ}\text{C}$
Storage temperature	T_{stg}	-60 ~ 150	$^{\circ}\text{C}$

CAUTION : Maximum ratings are for design aid only, not subject to production testing. Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

■ Electrical Characteristics ($V_{IN} = 1.2\text{V}$, $V_{DD} = V_{OUT} = V_{CE} = 3.3\text{V}$ $T_{opr} = 25^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Conditions	$T_{opr}=25^{\circ}\text{C}$			Units
			Min	Typ	Max	
Minimum start-up voltage	$V_{DD-Start}$	$I_{OUT} = 1\text{mA}$	-	0.85	1	V
Minimum Operating voltage	V_{OPR}	$V_{CE} = V_{IN}$	-	0.75	-	V
Output Voltage Range	V_{OUT}		2.5	-	5	V
Feedback Voltage	V_{FB}	$-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$	1.192	1.230	1.268	V
Quiescent Current (shutdown)	I_{OFF}	$V_{CE} = 0\text{V}$	-	-	1	μA
Quiescent Current (active)	I_Q	Measured on V_{OUT}	-	300	500	μA
NMOS Switch ON Resistance	$R_{NMOS,DSON}$	$V_{OUT} = 3.3\text{V}$	-	0.40	-	Ω
		$V_{OUT} = 5\text{V}$	-	0.35	-	
PMOS Switch ON Resistance	$R_{PMOS,DSON}$	$V_{OUT} = 3.3\text{V}$	-	0.70	-	Ω
		$V_{OUT} = 5\text{V}$	-	0.60	-	
NMOS Switch Leakage	$I_{NMOS,LEAK}$	$V_{LX} = 5\text{V}$	-	0.1	5	μA
PMOS Switch Leakage	$I_{PMOS,LEAK}$	$V_{LX} = 0\text{V}$	-	0.1	5	μA
Output Voltage	V_{OUT}	$V_{OUT} = 3.3\text{V}$, $I_{OUT} = 1\text{mA}$	3.201	3.300	3.399	V
		$V_{OUT} = 5\text{V}$, $I_{OUT} = 1\text{mA}$, $V_{IN} = 2.4\text{V}$	4.850	5.000	5.150	
Line Regulation		$V_{IN} = 0.8 \sim 3.0\text{V}$, $I_{OUT} = 10\text{mA}$	-	1	-	%/V
Load Regulation		$I_{OUT} = 1 \sim 100\text{mA}$	-	0.2	-	%/mA
NMOS Current Limit	I_{LIMIT}		600	850	-	mA
Max Duty Cycle	D	$V_{FB} = 1.15\text{V}$, $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$	80	85		%
Switching Frequency	F_{SW}	$-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$	0.85	1.2	1.5	MHz
CE Input	Threshold		0.35	0.60	1.5	V
	Current	$V_{CE} = 5.5\text{V}$	-	0.01	1	μA

Package Outline Dimension (SOT-23-6)



Dimension	Millimeter	
	Min.	Max.
A	0.889	1.295
A1	0.000	0.152
B	1.397	1.803
b	0.250	0.560
C	2.591	2.997
D	2.692	3.099
e	0.838	1.041
H	0.080	0.254
L	0.300	0.610

IMPORTANT NOTICE

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable. Canaan Semiconductor (CS) does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied. CS reserves the right to make changes to its products or to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current. No liability will be accepted by CS for any consequence of its use.

Customer should obtain the latest storage, soldering and handling information of products from CS before placing orders. No liability will be accepted by CS for any mis-storage, mis-soldering and mis-handling of the products, and the consequence of its use.

A few applications using integrated circuit products may involve potential risks of death, personal injury, or severe property or environmental damage. CS integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life-support applications, devices or systems or other critical applications. Use of CS products in such applications is understood to be fully at the risk of the customer. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

In no event shall CS be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

All content, text, images, data, information and other material ("Content") displayed, available or present on this document, including any trademarks or copyrights, are the property of CS or the designated owner and are protected by applicable intellectual property laws. Customer agree not to infringe upon or dilute any intellectual property of CS, as well as not to remove or modify any trademark, copyright or other proprietary notice appearing on this document. You are not allowed to reproduce, sell, publish, distribute, modify, or display this document or any Content without the prior written permission of CS.